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## Mapping the hospital billing process: The case of the a federal hospital in Rio de Janeiro

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### Abstract

The growing popular demand for improved health care by Brazilian public hospitals has been increasing the need for more efficient hospital management and stronger oversight of the use of public funds. To achieve these goals, it is necessary to improve the recording of information, not only to assure accurate patient clinical histories and to generate technical knowledge, but also to facilitate the administrative and financial management of hospitals. The objective of this study is to present the mapping of the various processes involve in billing of outpatient services at Hospital Federal dos Servidores do Estado (Federal Civil Servants' Hospital) in Rio de Janeiro, to identify problems and propose recommendations to improve these processes. The main evidence indicates that better process management will allow the introduction of a culture of quality in the support (administrative) areas and that better use of information technology resources should be established, to reduce duplicated effort, errors and failures in executing the processes, especially regarding the billing system.

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## 1. Introduction

In Brazil, recent years have seen a growing demand from society for better care by public hospitals. Meeting this demand requires improved management of these facilities and better oversight of the use of public funds.

Many specialists believe the health sector is the most complex in terms of management, due to its particular features, such as the broad scope and high relevance of health care services, the impact on patients' lives, the use of varied supplies and the fragmented value chain involving different agents, among others<sup>1</sup>. This situation poses a huge challenge to hospital administrators, particularly in Brazil, which is plagued by a chronic shortage of public funds. This longstanding problem has become even more acute recently, due to the economic, fiscal and political crises through which the country is passing.

This scenario has been stimulating the development of actions to improve the management practices of the National Health System (*Sistema Único de Saúde*, or SUS, literally the "Single Health System"), including better recording of information on the care given, which is important not only for formation of patient's clinical histories and for generation of technical knowledge, but also for the administrative and financial management of hospitals. In the area of technical knowledge, this registration of information sheds light on important epidemiological questions and thus helps in the development of health policies. From an administrative and financial standpoint, it supports transfers of funding between levels of government and the territorial organization of health services, among other aspects.

In Brazil, Edict (*Portaria*) 3,462, issued by the Ministry of Health<sup>2</sup> on October 11, 2010, requires systematic monthly input of data into two national systems: the Outpatient Information System (SIA/SUS) and the Hospital Information System (SIH/SUS), besides other local or more specific databases. The SIA/SUS and SIH/SUS are used to bill for services rendered in the ambit of the SUS and as sources of information for the planning, control, evaluation and auditing of health services.

Despite the efforts of the Ministry of Health to harmonize the recording of health information, a good deal of disparity exists among various caregiving institutions, requiring a case-by-case analysis of the processes of collecting the data that feeds these systems.

This study was applied at Hospital Federal dos Servidores do Estado (HFSE), a unit belonging to the network of federal public hospitals in the city of Rio de Janeiro. The HFSE was established 68 years ago and currently offers more than 40 specialized services, exclusively to patients using the SUS referred by basic care facilities (of all three levels of government) for treatment of diseases and conditions requiring complex procedures or regimens. As a referral hospital, it does not provide emergency care, only scheduled consultations and surgical procedures.

The objective of this study was to map the processes for recording the care given by the hospital and the outpatient billing system, on two forms, for the purposes of: a) analyzing the configuration of the processes of gathering information on the care given by the hospital; b) identifying problems that impair the quality of the outpatient billing process; and c) proposing recommendations to improve the processes. For the mapping, we employed "as is" modeling, whose aim is to learn the activities performed routinely "as things stand now".

The study was motivated by the need to show the importance of the processes of recording the care given and of billing for those services for the efficient management of public hospitals and planning by the Ministry of Health, and of expanding the scope of information on hospital management practices. Another factor was the opportunity to review the practices and observe the results of implementing improvements in management of the billing sector of the hospital in question.

This article is organized into five sections including this introduction. Section 2 describes the theoretical framework in which the study was carried out; Section 3 describes the research method and procedures; Section 4 reports the results; and Section 5 describes the conclusions.

## 2. Health Information and Hospital Billing Systems

The use of computerized information systems to support management of organizations is a global reality. The chances of an organization's being competitive in complex activities without the intensive use of tools based on

information technology are virtually nil<sup>3</sup>. In the area of hospitals, information technology is particularly important for development of the competencies necessary to provide services to society<sup>4</sup>.

Information systems in the field of health are essential both for public health actions and to allow efficient management, for which purpose the information generated must be accurate and valid. The quality of the records is a key element and depends on the correct filling out of the instruments for collecting data and inserting them periodically into various databases. This requires rationalization of the processes to feed these bases, because of the consequences that utilization of the information collected can generate for the management of health facilities and formulation of public policies.

The clinical records, from the standpoint of management, are important to identify the resources used in treating the patient, and from a care perspective, to continue the required treatment efficiently and to conduct medical research. Therefore, the processes of registering health care services must be structured to meet the different objectives of all those that participate in the organization. Efficient and accurate record keeping is thus an important part of the quality of the care given<sup>5</sup>.

The databases that are generated by health information systems (HIS) can be classified into three categories: (i) epidemiological, used for purposes of surveillance, evaluation and research of public health questions; (ii) administrative, employed for accounting and control of the production of the services rendered; and (iii) clinical, used to store clinical data on patients for future reference [6].

Table 1 presents the main national health information systems developed by the Brazilian federal government.

Table 1: Main National Health Information Systems

ABBREVIATION	NAME	STARTING YEAR	BASIC DOCUMENT
SIM	Mortality Information System	1975	Declaration of death
SIH-SUS	Hospital Information System of the SUS*	1991	Authorization for hospitalization
SINASC	Live Birth Information System	1990	Declaration of live birth
SINAN	Notifiable Disease Information System	1993	Individual notification form Individual investigation form
SI-PNI	National Immunization Program Information System	1994	Various
SIA-SUS	Outpatient Information System of the SUS	1994	Outpatient production bulletin
APAC	Authorization System for High-Cost/Complex Procedures	1996	Various
SIAB	Basic Care Information System	1998	Forms for enrolment and follow-up of families served by the family health teams and community health agents
SIOPS	Public Health Budget Information System	1999	Various
CNES	National Roll of Health Establishments	2000	Various

Source: <sup>6</sup>

The hospital billing is calculated by adding the amounts of all the bills issued in a determined period (normally monthly) for the services provided to the patients. The billing sector is important for hospital management, because it charges for all the care provided, to obtain payment for those services. The billing process depends on correctly filing out and updating each patient's medical chart or other forms used to record the care given and supplies used, to avoid underbilling or failure to charge for services. The various caregivers thus need to be properly trained to fill in these forms to assure that no costs are overlooked<sup>7</sup>.

\*In 1984, the Medical-Hospital Assistance System of the Social Security Administration (SAMPHS) was established, for the purpose of financing the hospital care provided by contracted private services. This system was later expanded to philanthropic hospital (1986), university and teaching hospital (1987) and all municipal, state and federal hospitals (1990), when the name was changed to SIH-SUS.

### 3. Methodology

This study was conducted using the process mapping method, in two phases: (a) gathering data and information to design the processes; and (b) analysis and recommendations for improvement.

In the first phase, information was obtained by means of the form proposed by Valle, Oliveira and colleagues<sup>8</sup>. This form was filled in by the researcher while observing the activities of the hospital staff in recording the care given and generating billing information for outpatient care, using two forms: the Consolidated Outpatient Production Bulletin (BPA-C) and the Individualized Outpatient Production Bulletin (BPA-I). These forms have the objective of identifying, among other aspects, the people responsible for the process along with the objective, scope, suppliers and clients of each process.

The information collected was used to design the processes to be studied in greater depth, to obtain a “snapshot” of the activities composing the routine processes (as is). To prepare the diagrams of the processes, we used the Bizagi Process Modeler software, chosen for its ease of use, its support for the Business Process and Model Notation (BPMN), one of the most popular techniques used for mapping processes, and because it is a program used by some of the units of the hospital.

The second phase involved a detailed study of the processes to support recommendations for improvements in the working processes of the billing sector. For this purpose, we conducted analyses based on the process improvement method proposed by Oliveira and colleagues<sup>9</sup>, formed by the following steps:

- a) Functional analysis, to assess if each process fulfills its objectives;
- b) Qualitative analysis, to ascertain the performance of each activity composing the process; and
- c) Evaluation of the requirements of users of the process, to assess whether the needs of clients and suppliers are being considered in the process.

This methodology enabled identifying the redundant activities and those that add value to the processes, as well as the needs to rationalize the work. These were tabulated to facilitate identification of the critical success factors and the respective opportunities for improvement.

To support the implementation of the proposals for improvement, two quality tools were used: 5W-1H and gravity, urgency and tendency matrix (GUT matrix).

### 4. Results

The mapping and design of the processes to record the care given and billing for outpatient services allowed identifying that the processing of the information is standardized by the SUS Informatics Department (DATASUS) and that the critical points identified are related to the initial recording of the data (recording of care production) and their formatting for billing (manual insertion in the system). In this way, it was possible to identify that improving the billing of the hospital depends on upgrading the collection and treatment of the data. The results of the analysis of the different activities that compose the process of recording the care given to outpatients and the respective proposals for improvements are detailed in Table 2.

Table 2: Analysis of the Process of Recording Care Given to Outpatients (as is)

Analysis of the Process of Recording Care Given to Outpatients (as is)			
Activity	People Involved	Critical Points	Opportunities for Improvement
<b>Record daily care given (production)</b>	Caregivers (doctors, nurses,	- The forms used in the outpatient care unit of the hospital do not have codes and classification of the patient's current occupation; - The forms do not present information necessary to differentiate the	- Revision/updating of the forms used by the outpatient unit; - Creation of forms that distinguish the

	therapists, etc.)	types of billing for outpatient services; - Incomplete filling out of forms by the caregivers <sup>†</sup> ; - The forms do not allow distinguishing the services performed according to caregiver category, especially by nurses and nursing assistants.	procedures for the two billing types; - Training of the caregivers and clerical staff; - Creation of a specific form to record the activities of the nursing service.
<b>Input the data on the production of each caregiver</b>	Production and Printing Sector	- Since the forms can be delivered up to noon of the first business day of the following month, the inputting of the data is not always concluded to enable full billing for the services rendered <sup>‡</sup> .	- Increase the number of data typists and/or increase their working hours in the last three days of the month.
<b>Input the test results</b>	Medical Statistics Sector	- The spreadsheets use to record the production broken down by type of service have outdated codes and include various tabs that calculate data on a bimonthly, quarterly or semiannual basis, making them slow. They also do not allow identifying services provided to the patient by other institutions and also rapid consolidation of nursing procedures, since all the data are recorded by type of service, not type of caregiver.	- Revision of the electronic spreadsheets: updating of the codes for procedures; inclusion of a space to indicate procedures not being performed at the hospital and the reason; - Creation of a specific spreadsheet to record the activities of the nursing service.
<b>File the forms</b>	Medical Statistics Sector	- The forms to record the care given are stored in an inappropriate place. The documents are filed in a room with poor lighting, on the floor together with other documents, making it hard to find a particular document in the future.	- Use of filing boxes or cabinets, arranged by month and year, as well as differentiation between clinical and surgical service.

We also analyzed the results of the billing process to check whether all the information received was being processed in the Outpatient Information System of SUS (SIA/SUS) and the quality of this processing. The information was obtained from the site <http://tabnet.rio.rj.gov.br/> by accessing the option “Produção Ambulatorial SIA – Sistema de Informações Ambulatoriais” and selecting the period from January 2014 to September 2015.

We examined the codes and the amounts billed, as well as the frequency of the information processing, cross-referencing these aspects with the information received. We identified quite a few errors, including misclassification of procedures (i.e., use of incorrect codes), discrepancies between the amounts received and processed, failure to issue billing based on information received, among other problems.

This finding required the development of immediate actions, prioritized through application of the GUT matrix, to resolve the problems identified and thus to reduce the vulnerability of the hospital to audits by the Ministry of Health and other oversight authorities, and to complaints by the public in general, since the information is available at a website available to the public.

The results of analyzing the processes enabled preparation of a series of recommendations to improve the working processes, using the 5W-1H tool. Of the recommendations made, those implemented immediately were monthly monitoring of the billing processing, including disallowed items due to errors or incomplete information, and allocation of appropriate infrastructure to the service, such as the provision of a more suitable place along with equipment and furniture for the activities. The others are being analyzed by the heads of the billing service.

## 5. Conclusions

Through the field study it was possible to state that the billing sector needs to improve its activities, in particular its billing procedures for outpatient services, with proper classification into categories. Process management should be used as an instrument to improve the quality of the information produced, by enabling identification of the requirements, bottlenecks and insufficiencies in the activities that compose the processes, to reduce the need for redoing work and provide more standardization and control of the activities.

Besides these benefits, process management will allow the introduction of a culture of quality in the administrative areas, because it focuses attention on continuous improvement and commitment to quality of

<sup>†</sup>The majority of forms analyzed did not contain the patient's age, which is an essential element for the billing process.

<sup>‡</sup>The billing documents must be sent to the Municipal Health Secretariat by the third business day of the following month.

processes. This is a basic requirement for the hospital to undergo external evaluation by quality certification organizations in Brazil.

The results of the study indicate that the billing for outpatient services is culturally seen as a secondary activity without high relevance for the hospital. The organizational involvement to implement improvements in the outpatient billing system is weak. Instead, there are only isolated efforts by some managers who are concerned with this question and want to show the correct work of their teams.

Therefore, the senior directors of the HFSE need to act together with the people in the billing sector to develop and implement mechanisms to increase awareness of caregivers and administrative staff of the importance of improving the billing system. The problems identified can largely be blamed on organizational inertia. Not only does the hospital administration not provide the necessary instruments for record keeping, there is a good deal of resistance to the necessary changes or a feeling of laxity, since no personal return is obtained by performing their activities better.

The study also revealed the need for greater integration between the billing sector and the caregiving areas to develop and implement improvements, and through team learning, to share knowledge and hold all those involved accountable for the results.

Finally, upgrading the hospitals information technology is an objective that needs to be pursued, to reduce rework, errors and failures in carrying out the hospital's billing process, to facilitate the routines of the caregivers in treating patients and providing preventive orientation.<sup>10</sup> But as is always the case of information technology, this will be a long process, requiring adequate planning and investments, so it can only be implemented gradually, to overcome resistances and obstacles. For this reason, the study was concluded with preparation of a proposal, which was submitted to the head of the billing sector aiming at continuity of the improvement project.

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